Design and Testing of Wing Leading Edge of a Light Transport Aircraft

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The design of wing leading edges are primarily based on certification requirements as defined by the regulatory for bird strikes. A typical wing leading edge comprises of skin, rib and baffle plate. The idea of a baffle plate is that it will prevent the bird from impacting the spar, in case of penetration of the skin. The selection of right materials, configuration and fasteners play an important role in containing the damage due to bird strike. The selection of the skin thickness was done based on the RAE empirical formula and through limited bird strike tests on plain leading edge specimens. The role of baffle and selection of its thickness were based on bird strike FE analysis. The selection of fasteners was done based on a rivet pull through tests on an aluminum plate. The selection of rib spacing was based on a parametric study through bird strike FE analysis. The design, analysis and fabrication of leading edge specimens was carried out at NAL and the bird impact tests were conducted at the Gas Turbine Research Establishment, Bangalore. An optimum design configuration of the leading edge is arrived through these studies which meets the regulatory requirements.